REMARKS

Attached hereto is a Request for an Extension of Time and the appropriate fee.

The Office Action referred to an Information Disclosure Statement of December 17, 2001, and applicant is not aware of any such Information Disclosure Statement. There is an Information Disclosure Statement that was recently submitted on May 20, 2003 to bring to the attention of the United States Patent Office the references cited in a co-pending European patent application. It is requested that those references be made of record.

The present invention, as defined in the claims, is directed to an improvement in a semiconductor laser device that can be incorporated in equipment and appliances to provide a relatively efficient light weight, low cost, high power laser beam. The present invention can utilize semiconductor laser arrays supporting a plurality of laser light oscillators for emitting laser beams that can be aligned and manufactured with such a pitch between the respective laser light oscillators that manufacturing can be easily accomplished while synchronizing the wavelengths and phases of the emitted laser beams from each of the laser light oscillators.

The present invention specifically provides an arrangement of the laser light oscillators and one or more optical elements to partially reflect, scatter or transmit a laser beam emitted from a laser light oscillator so that a sufficient portion of that laser beam will enter another of the plurality of laser light oscillators to enable a phase locking of the respective laser light oscillators. The laser light oscillators can be manufactured as sets of arrays, and the arrays can be stacked and appropriately aligned to enable a phase locking of each of the plurality of laser light oscillators in each of the arrays.

Thus, the present invention intentionally diverts a portion of an emitted laser beam so that it will enter another of the laser light oscillators that has been spatially positioned so that a

sufficient portion of the laser beam will enter adjacent an optical axis to enable the phase locking. Various arrangements of this plurality of laser light oscillators can be made with regards to different types of optical elements. For example, a diffraction grating can be used to divert a sufficient portion of the laser beam to enable the phase locking. Preferably the laser light oscillators are manufactured from conventional semiconductor procedures to produce the laser light oscillators.

Claim 1 has been amended to identify a semiconductor laser device that uses a diffraction grating so that when the plurality of laser light oscillators each emit a laser beam from an outlet thereof, the diffraction grating can at least partially reflect, scatter or transmit a portion of a beam into at least one of the other laser light oscillators to enable a phase locking.

Even if the plurality of laser light oscillators are arranged with a large pitch, a laser beam incident on the diffraction grating is reflected at an angle that can be accurately predetermined depending on the pitch of the grating. Thus, a portion of the laser beam emitted can be accurately directed to be incident on another laser light oscillator to insure that the laser beams emitted from the laser light oscillators can be easily phase locked, thereby giving less restrictions for both the designing and manufacturing of semiconductor laser devices and equipment in which they are going to be incorporated. The laser light oscillators that emit the laser beams have substantially the same wavelength to facilitate the phase locking arrangement. As can be appreciated, different wavelength arrays can be utilized to enable a switching from one wavelength to another while still realizing the advantages of the present invention for each of the individual laser arrays.

New Claim 29 defines an arrangement of an optical element so that at least a sufficient portion of a laser beam will be directed to enter another of the plurality of laser light oscillators

to enable a phase locking of the respective laser light oscillators. Dependent Claims 30-38 define additional novelty features over the cited art.

The Office Action cited the *Meissner et al.* (U.S. Patent No. 5,936,984) as anticipating Claims 1-3. The Office Action contended that it was "inherent that a portion of the laser beam from one of the oscillators is incident on at least another of the light oscillators due to simply unintentional reflections in the system." Applicant respectfully traverses this contention that the *Meissner* is an inherent anticipation of our invention.

As stated in *In re Felton* (CCPA 1973)179 U.S.P.2Q. 295:

> In this regard, we do not disagree with the Board's apparent conclusion that an intermediate structure made for the Sand's device could possess the characteristics called for in these claims. However, in view of the purpose for which the Sand's device is intended, it is apparent that it requires no critical dimensions which would lead to a structure inherently having those characteristics. Therefore, it would be mere happenstance, if any structure made according to Sand's met the limitations of the claims. An accidental or unwitting duplication of an invention cannot constitute an anticipation. *Tilghman v. Proctor*, 102 U.S. 77 (1880); *Eibel Process Co. v. Minnesota and Ontario Paper Co.*, 261 U.S. 45 (1923). For this reason, we do not believe that Sands has "identically disclosed or described" the invention as required of an anticipatory reference supplied under section 102. The disclosure as a whole cannot be considered to sufficiently direct one skilled in the art to the invention which is a single drop dispenser requiring critical dimensions.

Applicant respectfully submits that even if there were stray reflections that may be incident on another oscillator, it would certainly not be designed for the purposes of phase locking, and any such phase locking, if such could even occur under the teachings of the cited reference, would be a mere accident and not anticipatory of the present invention.

The *Meissner et al.* (U.S. Patent No. 5,936,984) actually teaches an array of pumping laser diodes, preferably with micro lenses, that can allow a more efficient cooling of the laserable

medium as well as enhancing the coupling of the pumping energy. *Meissner et al.* is specifically concerned with low scatter requirements for an interface between an end cap and a laserable medium. See Column 3, Lines 1-5. The flanged end caps are addressed with a cooling jacket and focus through a lens duct. As noted in Column 3, "Parasitic oscillations are reduced by the flanged design" (Lines 19-20). Each diode in the diode array has an attached cylindrical lens (Column 3, Lines 33-34).

The Office Action specifically referred to Figure 11 as being inherent in anticipating each of the features of our present claims. Figure 11 discloses a dual end-pumping arrangement where a pair of sources have their radiation focused on a laser rod. As noted specifically in Column 7, Line 2, through Column 8, Line 6, the bonded interface between the lens duct and the laser rod should have little or no scattering at the bond interface. It should also assist in limiting any light scattering on the surface adjacent the respective sources. Those portions are specifically coated with an anti-reflective coating 1111. See Column 7, Lines 50-52.

Thus, in summary, the *Meissner et al.* reference teaches inserting a lens duct between a pumping laser array and a laserable medium. In this regard, *Meissner* clearly teaches that the invention should attempt to prevent any scattering of light and remove any parasitic oscillations. *Meissner* proposes an anti-reflective coating be positioned directly opposite any laser diode array to help eliminate any parasitic oscillations. Certainly, the *Meissner et al.* reference does not teach nor suggest any phase locking by insuring a sufficient portion of the emitted laser beam from an individual laser diode be reintroduced into an adjacent laser diode to provide phase locking since it is trying to prevent such reflections.

The laser beams emitted from the laser diodes of the *Meissner et al.* disclosure are to be directed into the laser rod 101 to excite the laser rod to emit a laser beam. It would appear that

the Office Action is making a false assumption that a laser beam emitted from one laser array will pass through the optical elements and will be incident on the other laser array. The laser beams emitted from laser array 1101 or 1105 in Figure 11 are to be incident on the laser rod 101 to excite it to produce a laser beam with a different wavelength from that of the original pumping laser beams of the laser diode arrays. The optical elements 1103 and 1107 are specifically duct lenses which are certainly not equivalent to the optical element or diffraction grating employed in the present application. The *Meissner et al.* reference does not refer to any such optical element and certainly does not refer to a diffraction grating to serve the purposes of the present invention. The *Meissner et al.* reference does not teach nor suggest, nor does it provide any structure that would enable a phase locking of laser beams emitted from a plurality of laser light oscillators.

It is believed that the Office Action was cognizant that the *Meissner et al.* reference was not a teaching of the present invention to a person of ordinary skill in this field, but was rather relying upon the claim language of original Claim 1 as possibly being broad enough to be interpreted on just stray light reflections and scattering. It is believed that Claim 1 (amended) and the newly drafted claims clearly define the improvement of the phase locking alignment of an optical element or diffraction grating with a plurality of laser light oscillators to achieve the purposes of the present invention, and accordingly, these independent Claims 1 and 29 and their dependent claims are not anticipated nor suggested by the *Meissner et al.* reference.

The *Sallkatve et al.* (U.S. Patent No. 6,327,293) was cited to reject Claims 1 and 4 as being anticipated under 35 U.S.C. § 102. The Office Action noted the pump radiation sources 26 and 26a that are aligned at a 45-degree angle to a multi-layer semiconductor quantum well structure and more particularly to a compressively stressed InGaAs quantum well layer that has

been grown without a conventional alloy of aluminum. See Column 2, Lines 52-61, and Column 4, Lines 55-62. Leaving out aluminum-containing layers purportedly resolves long-term degradation problems, particularly at high power.

The pump radiation sources can be an 808 nm diode laser which is used to excite a stacked array with a quantum well structure so that it will emit a laser emission wavelength of 976 nm. See Column 5, Lines 44-56. This reference does not teach an optical element such a diffraction grating that is arranged to provide a phase locking and, in essence, only teaches two light sources 26 and 26a that are used to pump or excite a surface emitting laser element 12. The optical elements 28 and 28A are, in fact, lenses that simply focus the pumping laser source on the surface emitting laser element. As mentioned above, like the *Meissner et al.* reference, the *Sallkatve* reference fails to teach laser beams with substantially the same wavelength to be emitted from one laser light oscillator and to enter another light oscillator to permit a phase locking.

The Office Action alleged that the specifics of the optical elements, although not taught in any references, would be well-known and obvious. It is clear, however, that while optical elements and their functions are known by a person of skill in the optical field, it is their particular coactive positioning to enable a phase locking that is neither taught nor suggested by any of the references of record.

The Office Action further rejected Claims 16-17 and 19-28 over the *Meissner* reference in view of the *Craig et al.* (U.S. Patent No. 6,167,075). The *Craig et al.* reference was simply cited for the teachings of a laser array that may be index guided. Actually, the *Craig et al.* reference was teaching a redundancy in a lightwave communication system to increase its reliability. Thus, if in a fiber pumping source, one of the pumping elements fails, *Craig et al.*

suggests a redundancy while running the array of pumping sources below their maximum power. Thus, if one pumping source fails, it can be compensated by the remaining pumping sources such as laser diode emitters. To achieve this redundancy, however, *Craig* teaches that the individual laser diode emitters should have substantially no optical overlap with one another. See Column 3, Line 65 - Column 4, Line 23.

In essence, if the light created in the respective emitters does not extend or overlap into adjacent emitters, then there is no dark line propagation. See Column 4, Lines 20-23. *Craig* further suggests in Column 5 that the definition of "optical overlap" would occur even if there is less than one percent of radiation overlapping. As noted on Column 5, Lines 29-39, the teaching of the *Craig et al.* reference is to have zero overlap. He accomplishes this by using a micro lens for each emitter to insure that there is no overlap. See Column 5, Lines 47-48.

Craig et al. is further not concerned about phase locking since he selects the arrays to be substantially the same, or if they are different, to still be within the absorption band of the fiber amplifier. See Column 7, Lines 55-57. Needless to say, the *Craig et al.* reference is not concerned with a phase locking issue, nor is he concerned with a novel use of a diffraction grating as set forth in our present claims. Rather, the *Craig et al.* reference is concerned about optical overlapping and insures that its emitters are separated sufficiently enough so that there is "zero optical field overlap between adjacent emitters." Thus, the *Craig et al.* reference does not teach nor suggest the features missing from the principal *Meissner et al.* reference.

As noted in the case of *In re Rijckaert* (CAFC 1993), 28 USPQ2d 1955:

> In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1143, 1445, 25 USPQ2d 1443, 1444 (Fed. Cir., 1992). Only if that burden is met, does the burden of coming forward with evidence or argument shift to the

> applicant. *Id.* "A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested that claimed subject matter to a person of ordinary skill in the art." *In re Bell*, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) quoting *In re Reinhart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)). If the examiner fails to establish a *prima facie* case, the rejection is improper and will be overturned.
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> Rijckaert argues that the examiner has not established a *prima facie* case of obviousness and that the examiner's assumptions do not constitute the disclosure of prior art. We agree.

In summary, it is respectfully submitted that the invention defined in the presently pending claims more than adequately distinguish over any combination of references cited in the Office Action.

It is believed that the case is now in condition for an allowance, and an early notification of the same is requested. If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 23, 2003.

By: James Lee

Signature

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Very truly yours,

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